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IMAGE PICKUP DEVICE

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IMAGE PICKUP DEVICE

[Satsuzo sochi]

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[Attached amendments to this patent are included in the translation.]

Claim

In an image pickup device having a photoelectric converting means that converts copy images to synthesized video signals, a signal generating means that forms a signal for the purpose of controlling the iris of a lens in response to the brightness conditions that are obtained by means of this photoelectric converting means, a mechanical drive means that drives the iris of the lens in response to the signal from this signal generating means, and a visible display means that visibly displays the synthesized video signal that is obtained by means of the above-mentioned photoelectric converting means; an image pickup device that is characterized in that it is equipped with a brightness control means that conducts brightness control for the above-mentioned visible display means according to the average brightness of the copy image.

### Detailed explanation of the invention

#### Industrial application field

This invention relates to an image pickup device such as a video camera, and in particular, relates to an image pickup device that is equipped with a display means such as an electronic view finder (hereinafter, called EVF).

#### Prior art

A conventional image pickup device equipped with an EVF is shown in Figure 2. In the figure, (1) is a lens for the purpose of focusing the copy image on an image pickup element, (2) is an iris mechanism that is provided for the purpose of controlling the amount of light incident on the image pickup element, (3) is an image pickup element that accomplishes a photoelectric conversion, and the output of this image pickup element (3) is applied to a sample and hold circuit (5) by synchronizing with a clock generating means (4). For the outputs of this circuit (5), one is connected to an average brightness calculating means (6), and to the above-mentioned iris mechanism (2) via an iris drive circuit (7). The other is connected to a video signal processing circuit (8) for the purpose of visualizing the copy image. Furthermore, one output of the video signal processing circuit (8) is connected to an EVF (10) via a signal reproducing means (9).

Next, the operation will be explained. When the copy image that has passed through the lens (1) having the iris mechanism (2) is incident on image pickup element (3), the image pickup element (3) outputs an image pickup element output signal by responding to the clock pulse (4). For this output signal, the same signal is supplied to average brightness calculating means (6) for the purpose of controlling the iris opening through the medium of the sample and hold circuit (5), and to the video signal processing circuit (8) for the purpose of obtaining a synthesized video signal. Here, among these same outputs, the one that is applied to the average brightness calculating means (5) is converted to a signal corresponding to the brightness of the copy image based on a prescribed algorithm of this same means, and the iris mechanism (2) is controlled based on this output supplied to iris mechanism driving circuit (7). The iris control constructs a closed loop according to this means, and maintains at a constant level the average brightness of the copy image that is incident on the image pickup element (3). Also, the other [output], in other words, the image pickup element output signal that is applied to the video signal processing circuit (8), is processed by means of the same circuit as the final synthesized video signal. One of these outputs is output to the signal reproducing means (9), a signal for the purpose of driving the EVF (10) is output, and if this is supplied to the EVF (10), the copy image can be obtained as a visible image. For the other [output], if supplied to a not illustrated image recording device (for example, a VTR), the copy image can be recorded as an active image.

### Problems to be solved by the invention

Since a conventional image pickup device is constructed as above, if the copy image that is displayed by the EVF (10) is seen as a video of constant brightness, for example, because in an overwhelmingly bright outdoors it is too dark, and conversely, inside it is too bright, there is a problem that it becomes visually very strange.

This invention was created for the purpose of solving the above-mentioned types of problems, and its objective is to obtain an image pickup device with good visibility in all environments by means of conducting control of the brightness of the EVF in response to the brightness of the environs of the copy image.

### Means for solving the problems

The image pickup device related to this invention, in an image pickup device having a photoelectric converting means that converts copy images to synthesized video signals, a signal generating means that forms a signal for the purpose of controlling the iris of a lens in response to the brightness conditions that are obtained by means of this photoelectric converting means, a mechanical drive means that drives the iris of the lens in response to the signal from this signal generating means, and a visible display means that visibly displays the synthesized video signal that is obtained by means of the above-mentioned photoelectric converting means, is characterized in that it is equipped with a brightness control means that conducts brightness control for the above-mentioned visible display means according to the average brightness of the copy image.

### Operation

In this invention, since it is possible, by means of the brightness control means, to brighten EVF the brighter the surroundings of the copy image, and to darker it the darker the copy image surroundings, excellent visibility can be obtained under all types of environments.

### Application Example

Below, one application example of this invention will be explained based on a figure. Figure 1 shows a block [diagram] of an image pickup device according to this invention, and in the figure, the keys (1 to 10) are the same as those of the conventional image pickup device shown in Figure 2, and a redundant explanation is omitted. (11) is the brightness control means in this invention, and is a device for the purpose of conducting the control of the brightness of the EVF (10) in response to the brightness of the copy image.

Next, the operation of this invention will be explained. When a copy image that has passed through the lens (1) having iris mechanism (2) is incident on image pickup element (3), image

pickup element (3) responds to the clock pulse (4) and outputs an image pickup output signal. For this output signal, the same signal is supplied to the average brightness calculating means (6) for the purpose of controlling the iris opening through the medium of the sample and hold circuit (5), and to the video signal processing circuit (8) for the purpose of obtaining a synthesized video signal. Here, among the above-mentioned outputs, the one that is supplied to the average brightness calculating means (5) is converted to a signal corresponding to the brightness of the copy image based on a prescribed algorithm of this means (5), and the iris mechanism (2) is controlled based on this output supplied to iris mechanism driving circuit (7). The iris mechanism constructs a closed loop according to these means, and holds at a constant level the average brightness of the copy image incident on the image pickup element (3). Also, the other [output], in other words, the image pickup element output signal that is supplied to the video signal processing circuit (8), is processed by means of the same circuit so as to become the final synthesized video signal. One of these outputs is output to the signal reproducing means (9), it outputs a signal for the purpose of driving the EVF (10), and here this output is further supplied to the brightness control means (11), but here, the output of the average brightness calculating means (6) is further input, and the output is limited to a level compatible with this signal. Since this brightness control means (11) controls so that, if the average brightness calculating means (6) acts to restrict the iris mechanism (2) the output becomes large, and if it acts to enlarge it the output becomes small, and since the copy image that is projected on the EVF (10) is seen as brighter in bright locations and darker in dark locations, the visibility of the EVF is greatly improved.

Now then, in this application example, the signal that controls the brightness control means (11) was obtained by means of the output of the average brightness calculating means (6), but in addition, it is also possible to use a means that takes the average brightness of the copy image or its surroundings, for example, an optical sensor can be separately added, and its signal can be used.

#### Effect of the invention

As was explained above, according to this invention, since it is equipped with a brightness control means that conducts brightness control of the visible display means according to the average brightness of the copy image in a conventional image pickup device, control of the brightness of the EVF in response to the brightness of the surroundings of the copy image becomes possible, and by this means, an image pickup device that is equipped with an EVF having excellent visibility can be obtained.

#### Brief description of the figures

Figure 1 is a block diagram of an image pickup device according to an application example of this invention, and Figure 2 is a block diagram of a conventional image pickup device.

- 1 Lens
- 2 Iris mechanism
- 3 Image pickup element
- 4 Clock generating means
- 5 Sample and hold circuit
- 6 Average brightness calculating means
- 7 Iris mechanism drive circuit
- 8 Video signal processing circuit
- 9 Signal reproducing means
- 10 EVF (electronic view finder)
- 11 Brightness control means

The same keys in the figures show identical or equivalent components

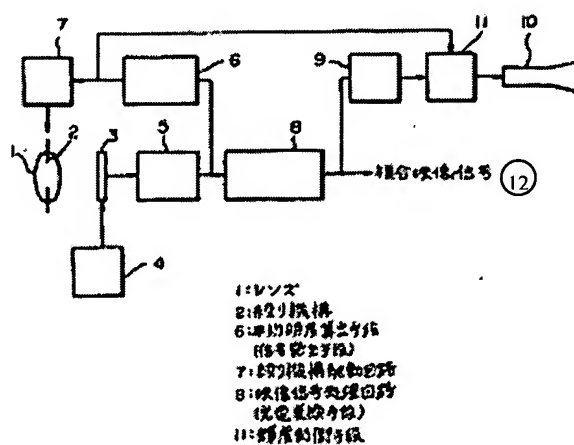


Figure 1

- Key:
- 1 Lens
  - 2 Iris mechanism
  - 6 Average brightness calculating means (signal generating means)
  - 7 Iris mechanism drive circuit
  - 8 Video signal processing circuit (photoelectric converting means)
  - 11 Brightness control means
  - 12 Synthesized video signal

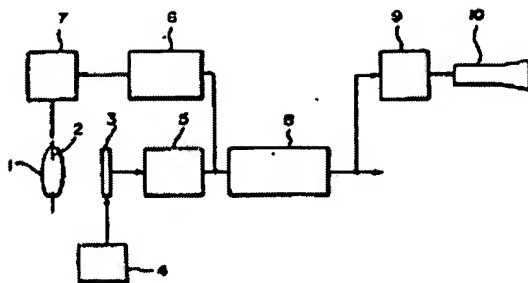


Figure 2